

Why CBRS?



Spectrum sharing will encourage innovation driven by what users demand and the market can deliver. "We see a lot more advantages in the sharing of spectrum than purely the efficiency of the spectrum. This is because we can see more innovative uses being enabled by shared access." Flexibility is crucial in this approach: "from an authorization perspective [we want to] allow users to have the spectrum they need, for what they need, in the place they need it."

"What we need to do is to enable permissive things to happen, as opposed to trying to predict what should happen. One of the things that is quite key is that we shouldn't go for a world where innovation is by permission. For us, innovation is something that we should try to facilitate. We'd like to make sure that people have the option to use it, as opposed to us saying that this is what you should do with it."

Monica Paolini, A conversation with Philip Marnick, Group Director, Spectrum, Ofcom, and Cristina Data, Director, Spectrum Insight and Analysis, Ofcom, RCR Wireless News, May 2, 2017



Why CBRS (Citizens Broadband Radio Service)?

Ever growing:

- Data demand
- Users
- Devices
- Appliances
- Objects
- Sensors

Service Providers

 Need more capacity at low TCO from a given spectrum

Enterprises

 Require Private LTE to meet special demands

FCC (Regulator)

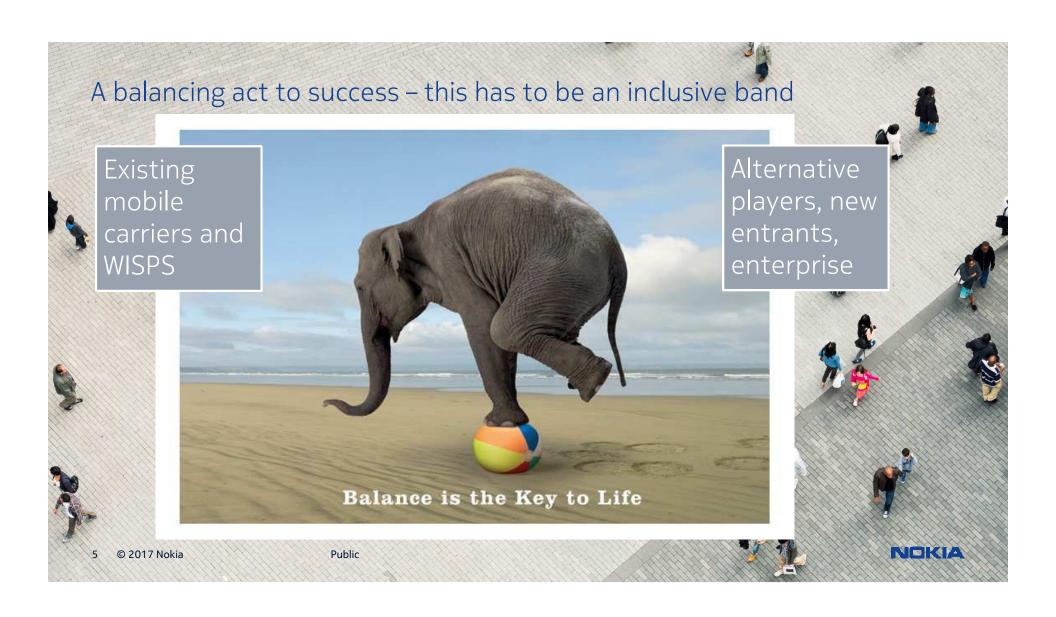
 Wants the efficient use of scarce spectrum

Shared spectrum is required for all of the above – resulting in CBRS



Public





Current Industry View 2016 2017 2018 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q2 Q3 Q4 Q1 Specification Rel 1 NIN NIN Specification Rel 2 SAS Test & Certification Specs Rel 1 CBSD Test & Certification Specs Rel 1 2nd R&O (5/16) SAS Certification process GAA S deployment ESC Approval process Auction starts CBSD/Proxy Certification process Alliance Alliance Established CBRS Trials Release 1 Release 2 Band 48 Band 42 Ecosystem Commercial Band42/43 Lab & Field Trials Band 48 Band 48 CPEs * Start SAS product Certification * Start ESC product Approval * Start CBSD product Certification * First SAS products Certified * First ESC products Approved * First CBSD products Certified

Use cases examples

Private or Dedicated LTE

- Full customization of LTE
- Low TCO, Easy deployment
- High capacity
- Enhanced Mobility compared to Wi-Fi
- Security, Surveillance

Other benefits

- 3GPP band 48 recognition
- Channel to new business opportunities
- Creation of Private or Public LTE networks for industrial or enterprise use

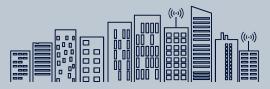
Improved Internet of Things

- Industrial
 - Business Critical
- Home
 - Capacity, Coverage
- Outdoor
 - Smart City, Mobility, Safety



Enabling new business models in all verticals

- Neutral Host, HetNet, Offloading in HotSpots
- Indoor or outdoor coverage





Nokia

Trust Nokia: An innovation force and thought leader in Mobile Broadband

Top ranking by major analysts includes:

Recognition by Gartner in Leaders quadrant of Magic Quadrant for LTE Network Infrastructure

#1

Based on Award winning Flexi Zone Small cells, Services for HetNet and Market Leading LTE with Best KPIs delivered for LTE

#1

LTE

One of the six founding members of CBRS Alliance, Co-Chair for Spectrum Sharing group of WINN Forum

#1

Global Carrier Networks customers Serving over 3Billion end users

600

Highest users/cell

Delivered in live network

capacity

LTE: Mobility, Quality of Experience, Ideal for Dense Networks, Self Optimizing

CBRS LTE

Can be deployed as TDD LTE, LAA and Co-exists other technologies

Shared Spectrum: Reduced to zero investment in spectrum cost, Private LTE with higher capacity, increased customization, and Deployment simplicity

NOKIA

Shared Spectrum

